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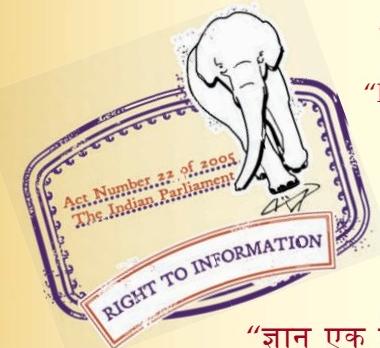
“Step Out From the Old to the New”

IS 5309 (2001): Poultry Farming Equipment - Brooders [FAD  
5: Livestock Feeds, Equipment and Systems]

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( दूसरा पुनरीक्षण )

*Indian Standard*

**POULTRY FARMING EQUIPMENT —  
BROODERS — SPECIFICATION**

( *Second Revision* )

ICS 65.020.30

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**BUREAU OF INDIAN STANDARDS**  
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NEW DELHI 110002

## FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Livestock Husbandry Equipment Systems Sectional Committee had been approved by the Food and Agriculture Division Council.

Brooders are used extensively for hatching of poultry in commercial poultry farms. There are mainly two types of brooders which are most commonly used. They are: a) battery brooders, and b) floor brooders. Battery brooders are used by large poultry farms because large number of chicks can be grown per unit area with less labour cost, whereas floor brooders are commonly used by small poultry farms.

This standard was first published in 1969 and subsequently revised in 1987. Earlier it was in two parts: IS 5309 (Part 1) : 1987 'Specification for brooders: Part 1 Battery brooders covered requirements for battery brooders' whereas IS 5309 (Part 2) : 1987 'Specification for brooders: Part 2 Floor brooders covered requirements for floor brooders'. While reviewing these standards, the committee decided to amalgamate them into one standard to make it more comprehensive and user friendly. With the publication of this standard the above mentioned standards shall be withdrawn.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2:1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

## Indian Standard

# POULTRY FARMING EQUIPMENT — BROODERS — SPECIFICATION

*( Second Revision )*

## **1 SCOPE**

This standard lays down the requirements and the tests of battery brooders and floor brooders.

## **2 REFERENCES**

The following Indian Standards contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
302 (Part 1) : 1979	General and safety requirements of household and similar electrical appliances ( <i>fifth revision</i> )
694 : 1990	PVC insulated cables for working voltages up to and including 1 100 V ( <i>third revision</i> )
9968 (Part 1) : 1988	Elastometer-insulated cables: Part 1 For working voltage up to and including 1 100 V ( <i>first revision</i> )
12360 : 1988	Voltage bands for electrical installations including preferred voltage and frequency

## **3 TERMINOLOGY**

**3.0** For the purpose of this standard, the following definitions shall apply.

**3.1 Battery Brooder** — A number of enclosed chambers designed and constructed for rearing chicks and built up to usually 4 to 5 tiers one above the other with arrangements for automatic heat control, regulated ventilation and provisions for feeding and watering on the sides of a wire netted enclosure extending on one side.

**3.2 Floor Brooder** — A metallic hover, double or single walled, insulated or built-in insulation fitted with thermostatically controlled heating

arrangements for providing uniform temperature in the area covered by it.

**3.3 Heating Element** — The actual electrical conducting material which has been designed to be heated by an electric current together with its immediate insulation, supports, terminals, etc, forming an integral unit.

**3.4 Heating Unit** — A heating element together with detachable cover or sheath, which protects the heating element from contact with external parts. The heating element itself may form the heating unit.

**3.5 Non-Ignitable Material** — The material, which when maintained at 750°C neither burns nor gives off flammable vapours in sufficient quantities to ignite at a pilot flame.

**3.6 Rated Voltage** — The voltage assigned to the brooder by the manufacturer and marked on it.

**3.7 Rated Voltage Range** — The voltage range limits assigned to the brooder by the manufacturer and marked on it.

**3.8 Temperature Differential** — The cyclic change of temperature at any point, regulated by the operation of the thermostat.

**3.9 Temperature Drift** — The change in brooder temperature which may take place in continuous operation over a long period.

**3.10 Temperature Overshoot** — The amount by which the maximum temperature attained by air at the centre of the working space during the initial heating up, exceeds other brooder temperature when steady operating conditions of the thermostat are reached.

**3.11 Temperature Variation** — The difference in temperature of air at the centre of the working space and at any other point in the working space at any instant.

**3.12 Thermostat** — A device, which in normal use, keeps the temperature of the brooder between certain limits by automatically opening and closing of circuit or by varying the current.

## 4 SOURCE OF SUPPLY

**4.1** The brooder heating element shall be operated by electricity or by burning kerosene (Kerosene Floor Brooders).

**4.1.1** In case of electricity operated type, the rated voltage shall be 240 V; however, 230 V is also permissible for the time being (*see IS 12360*). When the range of voltage is to be specified, it shall be 230 to 240 volts.

## 5 MATERIALS

### 5.1 Battery Brooder

The body and dropping trays shall be made of galvanized iron sheets of thickness 0.63 mm (*Min*). The floor shall be of galvanized iron mesh of 1.6 mm (*Min*). The frame shall be made of suitable size angle iron. The two-third part of the body (except the top) shall be made of minimum 1.3 mm iron mesh and shall serve as run.

### 5.2 Floor Brooders

The hover shall be made of galvanized iron sheets of thickness 0.63 mm (*Min*) with or without insulating material. The stand shall be of mild steel angle iron of suitable size. Other metallic material of equal or higher strength may also be used.

## 6 CONSTRUCTIONAL REQUIREMENTS

### 6.1 Battery Brooders

#### 6.1.1 Brooding Compartments

The battery brooder shall consist of usually 4 to 5 brooding compartments arranged in tiers one above the other. Nearly 1/3 part of each tier shall be heated electrically with heating elements and 2/3 part of the compartment shall form the run which will also provide a range of temperature for the chicks. There shall be an incomplete partition from the roof towards the floor to retain warmth in the hover area and to provide a suitable space for easy movement of chicks from hover to the run and vice-versa. A transparent glass window shall be provided in the solid shutter of the brooder to watch the chicks without disturbing them. The space provided to a chick in the brooder varies from 150 to 200 cm per chick depending upon the type of chicks brooded, that is, light or heavy.

##### 6.1.1.1 Floor

Each compartment shall have a wire floor under which there shall be a metal tray for collecting the droppings.

##### 6.1.1.2 Feed and water troughs

Feed and water troughs placed around outside the run area of each compartment shall be provided.

#### 6.1.1.3 Light

There shall be a bulb of not more than 15 watt in each compartment to facilitate feeding during night. This shall be protected by wire guard. No extra light is required when electric lamps are used to provide warmth.

#### 6.1.1.4 Pilot lamp

There shall be a pilot lamp, visible from the front to indicate whether the brooder is 'on' or 'off'.

## 6.2 Floor Brooders

### 6.2.1 Space

Hover area of 45 cm shall be provided per chick.

**6.2.2** One or more outlets with adjustable cover shall be provided at the top of the hover.

**6.2.3** Floor brooder shall have adjustable legs or hanging chains to regulate the height of brooders with the age of the chicks.

**6.2.4** The heating elements shall be so constructed that any movement that may occur in normal service shall not put any undesirable strain on electrical connections nor cause any reduction of the spacing.

**6.2.5** Floor brooder shall be suspended so that the surface of the heating unit is not less than 380 mm above the litter. Generally, when lamps are used, the brooder shall be placed so that the bottom surface of the lamp is about 450 mm from the litter.

#### 6.2.6 Special Requirements for Kerosene Floor Brooders

**6.2.6.1** Lamp container shall be accessible through lift-up metal side and should have a hole to observe the flame conveniently from outside.

**6.2.6.2** There shall be an outlet on the top of the brooder through which fumes shall be let out.

**6.2.6.3** There shall be a heat spreader reflector at the centre to ensure uniform heat. There shall be a wire gauge or perforated steel casing over the lamp.

**6.2.6.4** In case of larger brooders, the oil tank shall be kept away from the brooder and it shall not be filled to its full capacity.

**6.2.6.5** A baffle plate under the burner shall be provided to avoid any possibility of leaked oil to fall on the litter.

## 6.3 Requirements Common to Battery and Floor Brooders

### 6.3.1 Ventilation

Suitable openings for ventilation shall be provided for circulation of fresh air in the brooders. Intake of air

shall be provided either through windows or adjustable openings in the sides near the floor. One or more outlets with the adjustable cover shall be provided at the top of the wall near the roof so that the amount of opening could be regulated.

### **6.3.2 Thermometer**

Each brooder shall be equipped with a mercury-in-glass or some other dependable and conveniently readable thermometer which shall be arranged to measure the temperature of the air inside the brooder. Thermometer shall not be located near the source of heat to avoid faulty reading on the higher side. A suitable supporting fixture shall be provided for the thermometer and it shall be so located that its sensing element is at least 50 mm above the floor and near the outer part of the hover towards the run. The temperature reading may be seen without opening the brooder. The thermometer shall be capable of measuring within an accuracy of 0.5°C throughout the appropriate range.

### **6.3.3 Mechanical Assembly**

**6.3.3.1** Parts used in the construction of brooders shall be assembled and secured in position to ensure the proper functioning.

**6.3.3.2** Thermostat, switches, heating elements, etc, shall be fastened securely and rigidly for operational convenience. To prevent turning of a stem-mounted control, suitable lock washer may be used.

**6.3.3.3** Screws or other fastenings of fragile insulating parts shall not be so tight as to result in cracking or breaking of such parts due to expansion and contraction, unless the insulating material is completely retained. Generally, such parts shall be slightly loose or shall be provided with cushioning material, for instance, washers.

**6.3.4** Protection against rusting and corrosion iron and steel parts shall be suitably protected against rusting and corrosion. The surface of metal parts shall be protected against scaling, flaking, or other effects of corrosive action which might cause subsequent reduction in the dielectric strength of brooders.

## **7 REQUIREMENTS OF ELECTRICAL COMPONENTS**

### **7.1 Heating Elements**

Heating elements shall be provided in each compartment/ hover to have the desired temperature range of 24°C to 38°C. The heating elements shall be so distributed that the temperature is fairly uniform in every compartment.

**7.1.1** Heating elements shall be supported in a substantial and reliable manner and shall be protected

against normal mechanical injury and contact with outside objects.

### **7.1.2 Guards for Heating Elements**

**7.1.2.1** Heating elements shall be so guarded that the persons shall be protected from coming in contact with them.

**7.1.2.2** Glass enclosed heating elements shall be so recessed or otherwise guarded that breakage of the glass envelope is unlikely.

**7.1.2.3** Guards shall be of rigid construction and shall be attached by screws or the equivalent so that they shall not be unintentionally dislodged.

**7.1.3** For connection of heating elements, the provisions of IS 302 (Part 1) shall apply.

### **7.2 Thermostat**

Brooders shall be equipped with a thermostat capable of controlling the temperatures over the required temperature range of 24°C to 38°C. The thermostat contact shall be accessible for inspection, cleaning or replacement. A suitable wire guard shall be provided to protect the thermostat from being damaged by the chicks.

### **7.3 Supply Connections**

#### **7.3.1 For Stationary Brooders**

**7.3.1.1** The location of terminal boxes or compartment in which supply connections are made shall be such that connections shall be readily accessible for inspection after brooder is installed as intended but not without opening the cover which shall be secured by screws or the equivalent.

**7.3.1.2** Openings of conduit connection shall be located in essentially flat surfaces in order that locknut, etc, shall lie flat.

**7.3.1.3** Knock outs or openings for conduit connection shall have adequate diameters to accommodate different sizes of rigid and flexible conduits or cable connectors.

#### **7.3.2 For Portable Brooders**

**7.3.2.1** Portable brooders shall be provided with rubber insulated flexible cords [see IS 9968 (Part 1)] or PVC insulated flexible cords (see IS 694) having an additional base or green insulated conductors for grounding exposed non-current carrying metal parts. The cord shall have a suitable attachment plug cap provided with an additional grounding point for connection to the source of supply.

**7.3.2.2** Flexible cords shall be provided with strain relief so that mechanical stress on the cord shall not be transmitted to terminals, splices or wiring. Means

shall be provided for preventing cords from being pushed into brooders if they would be subjected to mechanical damage or to temperature beyond the permissible limit for the cord.

**7.3.2.3** Flexible cords and plugs shall have a current rating at least equal to the maximum input in amperes under normal operating conditions.

**7.3.2.4** At the point where flexible cord passes through an opening in a wall barrier or enclosure, there shall be a suitable bushing or some equivalent provision which shall be reliably secured in place and shall have a smoothly rounded surface against which the cord may bear.

#### 7.4 Terminals

The provisions of 26 of IS 302 (Part 1) shall apply.

#### 7.5 Electrical Insulation

**7.5.1** The insulating materials may be mica, porcelain, phenolic composition and cold moulded materials. Unless otherwise specified, wood, cotton, silk paper and similar hygroscopic materials shall not be used for insulation without impregnation.

**7.5.2** The insulating material shall have sufficient dielectric strength and insulation resistance which have bearing on fire and accidental hazards under conditions of actual use.

#### 7.6 Internal Wiring

**7.6.1** Wiring connections between components shall have a current carrying capacity at least equal to the maximum load except that no conductor shall be smaller than 3.8 mm. The wiring shall be properly laced and secured and conductors operating at mains potential shall be well separated from those operating at lower potential.

**7.6.2** At all places where conductors pass through outer casing or internal positions, they shall be adequately protected.

#### 7.7 Enclosure for Live Parts

**7.7.1** Brooders shall have enclosures of incombustible, absorption resisting materials which shall enclose all live parts including a supply cord.

**7.7.2** Enclosures shall be formed and assembled so that they shall:

- a) have the strength and rigidity necessary to resist the abuses to which they may be normally subjected, without increasing the fire or accidental hazard due to deformation of the enclosures with resulting reduction of spacings, loosening or displacement of parts, etc;
- b) afford protection against accidental contact with bare live parts; and

- c) afford protection for electric components against the deleterious effects of exclusive moisture and droppings.

#### 7.7.3 Openings in Enclosures

**7.7.3.1** Openings for ventilation or other purpose shall be constructed, located or baffled to prevent a straight rod from being inserted to touch live parts.

**7.7.3.2** Unless provided with adjustable cover, there shall be no opening in enclosures directly below terminals, switches, glowing type heating elements, wires or other live parts.

#### 7.8 Earthing

The provisions of 27 of IS 302 (Part 1) shall apply.

#### 7.9 Creepage Distance and Clearance

The provisions of 29 of IS 302 (Part 1) shall apply.

#### 7.10 Lamp Holders

Lamp holders shall be mounted rigidly, protected from mechanical injury and prevented from turning. Lamp holders intended for use in infra-red heating lamps shall be properly secured in position.

### 8 MARKING

**8.1** Each brooder shall be marked indelibly and clearly on its outer surface or on a name plate firmly attached on it with the following:

- a) Manufacturer's name or trade-mark,
- b) Rated voltage or voltage range in volts,
- c) Nature of supply, and
- d) Rated input in watts.

**8.1.1** Heating elements shall also bear the manufacturer's name or trade-mark.

**8.1.2** The marking shall also show the minimum ambient temperature at which the brooder is suitable for operation.

**8.1.3** Each brooder may also be marked with the Standard Mark.

**8.1.3.1** The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

#### 9 TESTS

The tests shall be classified into two categories, namely, routine and type tests.

## **9.1 Routine Tests**

### **9.1.1 Loading Test**

The total input of the brooder with all heating elements in circuit and all auxiliary components functioning shall be measured after steady operating conditions have been obtained, the brooder being operated at the maximum rated voltage. The measured value shall not differ from that marked on the nameplate by more than 7.5 percent.

### **9.1.2 Temperature Control Tests**

#### **9.1.2.1 Temperature variation test**

With the temperature sensing elements, the temperature difference shall be read with reference to the sensing element located at the centre of the working space. The temperature variation at each point shall be determined by taking the mean of at least 3 readings of temperature difference at the point. The maximum temperature variation between any two points tested shall not exceed 1.5°C.

#### **9.1.2.2 Temperature differential test**

With the temperature sensing element located at different points, the temperature at each point shall be recorded continuously at intervals of not exceeding 5 minutes during a three hour test period. The temperature differential measured at any point shall not exceed 1°C.

#### **9.1.2.3 Temperature overshoot test**

The amount by which the maximum temperature obtained during heating up exceeds the average temperature conditions have been reached shall be 'overshoot' and shall not exceed 1°C.

### **9.1.3 Heating-up Test**

The brooder, when switched on at ambient temperature with the temperature control adjusted to the maximum setting, shall reach the maximum temperature at the end of 45 minutes.

### **9.1.4 Leakage Test for Kerosene Operated Brooders**

The tube connecting the burner, if any and the joint below the burner shall not show any sign of oil leakage when it is subject to 100 kPa pressure and operated for 30 minutes.

## **9.2 Type Tests**

### **9.2.1 Visual Examination and Inspection**

Each brooder shall be examined and inspected for general construction and marking requirements specified in this standard.

### **9.2.2 Temperature Drift Test**

With the brooder adjusted as described in 10.1.2.2, the brooder temperature shall be recorded once in every 8 hours with the thermometer located in the centre for a continuous period of 72 hours. The temperature drift so measured shall not exceed 1.5°C.

### **9.2.3 Leakage Current Test**

The test shall be carried out in accordance with 13.2 of IS 302(Part 1).

### **9.2.4 Earthing Continuity Resistance Test**

The test shall be carried out in accordance with 27 of IS 302 (Part 1).

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### Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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